CITY OF FORT WAYNE MASTER UPDATED: 1/5/15

SECTION

NTS: This section covers non-pressurized HDPE pipe for gravity sewer applications. HDPE pipe covered in this section is corrugated dual-walled, direct bury HDPE Pipe, and is typically used in storm sewer applications.

This section contains detailed descriptive requirements of the product(s) of the named manufacturer(s). If the product of another manufacturer is to be included, this section may require editing.

Coordinate this section with applicable requirements of Division 33 installation. Installation and jointing methods are included in the applicable piping installation section. Trenching and backfill information is in 33 00 05 Trenching and Earthwork.

1. GENERAL
   1. DESCRIPTION
      1. Scope:
         1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install the High Density Polyethylene (HDPE) utility pipe and fittings as shown and specified.
      2. Coordination:
         1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with, or before, the HDPE utility pipe Work.
      3. Related Sections:

NTS: List below only sections covering products, construction, and equipment specifically identified in this section and specified in another section and directly referenced in this specification. Do not list administrative and procedural Division 01 sections.

* + - 1. Section 31 00 05, Trenching and Earthwork.
      2. Section 31 05 19, Geosynthetics for Earthwork.
      3. Section 33 41 00, Storm Utility Piping Installation.

NTS: Section “1.2” is to be included if project is bid on unit price basis. Section to be deleted or revised if project is to be bid on lump sum basis.

NTS: Insert at (--1--), (--2--) and (--3--) below the various non-pressure HDPE pipe types and diameters to be used for project. Adjust Section “1.2” below for additional work item numbers as needed. In extreme cases consider separating the work items by diameter and depth.

Review Paragraph “A.4”: below and modify to suit the project.

NTS: Insert at (--1--), (--2--) and (--3--) below the various metal castings types to be used for project. Adjust section “1.2” below for additional work item numbers as needed.

* 1. MEASUREMENT AND PAYMENT
     1. HDPE Pipe
        1. Work Item Number and Title

**33 05 38.13-A (--1--) HDPE Non-Pressure Utility Piping**

**33 05 38.13-B (--2--) HDPE Non-Pressure Utility Piping**

**33 05 38.13-C (--3--) HDPE Non-Pressure Utility Piping**

* + - 1. The quantity of pipe installed shall be the number of linear feet actually installed, backfilled and tested, as measured from outside wall of structure to structure, along the centerline of the pipe.
      2. The payment of pipe shall be based on the unit price per linear foot as listed on the submitted Bid schedule for each pipe size successfully installed. Payment for any associated restoration shall be paid for under its respective Work item.
      3. This item shall include all costs to furnish all labor, materials, tools, and equipment, both permanent and temporary, to install the HDPE pipe as shown and specified. The Work includes, but is not limited to, trench excavation, dewatering, furnishing and placement of bedding, pipe, filter sock when applicable, placement of required backfill, disposing of excess excavated material, required fittings, compaction of bedding and backfill, temporary sheeting, shoring and bracing, restoration/replacement of all disturbed items not included under other Work items, protection of existing utilities and structures, and incidentals for performing all Work as specified unless otherwise provided for as a separate Work item.
  1. REFERENCES

NTS: Retain all applicable standards below and add/delete as required.

* + 1. Standards referenced in this Section are listed below:
       1. American Association of State Highway and Transportation Officials.
          1. AASHTO M252.
          2. AASHTO M294
       2. ASTM International.
          1. ASTM D1056 Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
          2. ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
          3. ASTM D3350 Specification for Polyethylene Plastics Pipe and Fittings Materials.
          4. ASTM D6707 Standard Specification for Circular-Knit Geotextile for Use in Subsurface Drainage Applications
          5. ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings
          6. ASTM F477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
          7. ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings
          8. ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
          9. ASTM F2306, Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications.
          10. ASTM F2648 / F2648M Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications
  1. QUALITY ASSURANCE

NTS: Edit or delete Paragraph "A" below, if project requirements prohibits experience clause.

* + 1. Manufacturer’s Qualifications:
       1. Manufacturer shall have a minimum of 5 years’ experience producing substantial similar type materials and shall be able to show evidence of at least 5 installations in satisfactory operation for at least 5 years.
    2. Component Supply and Compatibility:
       1. All pipe and fittings of each material type shall be furnished by the same manufacturer.
       2. The HDPE utility pipe and fittings manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
  1. SUBMITTALS

NTS: Review Paragraph “A” and “B” below and modify or eliminate to suit the project. Piping layout should only be requested for special circumstances.

* + 1. Action Submittals: Submit the following:
       1. Product Data:
          1. Submit product data on pipe, fittings, gaskets, hardware, pipe gasket lubricant and appurtenances sufficient to demonstrate compliance with the Contract Documents.
    2. Informational Submittals: Submit the following:
       1. Certificates:
          1. Submit manufacturer’s certificate of compliance with standards referenced in this Section.
       2. Source Quality Control Submittals:
          1. When requested by Engineer, submit results of source quality control tests. Ensure the quality control tests were completed on the same batch of material, as installed.

NTS: Edit or delete Paragraph “3” below if project requirements prohibit an experience clause.

* + - 1. Qualifications Statements:
         1. Submit qualifications of manufacturer when requested by Engineer.
         2. Submit qualifications of installer when requested by Engineer.
  1. DELIVERY, STORAGE, AND HANDLING
     1. Ship and store in accordance with manufacture’s recommendations.
     2. Inspect all materials during unloading process.
     3. Notify Owner of any cracked, flawed or otherwise defective material.
     4. Remove all materials from the Site that are found to be unsatisfactory.
     5. Handle pipe in a manner that does not over stress the pipe. Vertical and horizontal curves shall be limited so that wall stresses do not exceed 50% of yield stress for flexural bending of the pipe. If the pipe is buckled or otherwise damaged, the damaged section shall be removed and replaced by the Contractor at his expense.
     6. Inspect delivered pipe for cracked, gouged, chipped, dented or other damaged material and immediately remove from site. Sections of pipe with cuts and gouges exceeding 10 percent of the pipe wall thickness or kinked sections shall be removed and the ends rejoined.
     7. Comply with Section 01 65 00 Product Delivery Requirements and Section 01 66 00 Product Storage and Handling Requirements.

1. PRODUCTS
   1. MATERIALS
      1. General
         1. HDPE piping system shall be specifically designed, constructed, and installed for the service intended.
         2. The HDPE pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density and other physical properties.
         3. Clean rework or recycled material generated by the manufacturer's own production may be used as long as the pipe or fittings produced meet all the requirements of this Section.
         4. Material Properties
            1. Material for pipe production shall be an engineered compound of virgin and recycled high density polyethylene conforming with the minimum requirements of cell classification 424420C (ESCR Test Condition B) for 6 through 10 inch diameters, and 435420C (ESCR Test Condition B) for 12 through 36 inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4 percent.

NTS: Edit or delete Sections B and C below as required for specific project requirements.

NTS: HDPE non-perforated pipe dual-walled (ASTM F2306) is available from 12 to 60 inch diameters. For stormwater use it is recommended to use only 12” to 36” diameter. If project requires recycled materials edit Article “B” below and require pipe manufactured per ASTM F2648. ASTM F2648 pipe uses recycled resin. Edit article below based on project specific requirements.

* + 1. DUAL-WALLED HDPE NON-PERFORATED PIPE
       1. Manufacturers: The following manufacturers and products will be accepted.
          1. ADS – N12 Non-Perforated
          2. Or approved equal
       2. Pipe shall be flexible, non-perforated dual wall HDPE piping with smooth interior walls unless otherwise noted on the plans.
       3. Pipe shall have smooth interior and annular exterior corrugations.
       4. Pipe Material
          1. 12- through 36-inch shall meet ASTM F2306 or AASHTO M294 Type S.
       5. Joints
          1. Pipe shall be joined using a bell and spigot joint meeting AASHTO M252 and AASHTO M294.
          2. Joint shall be water-tight in accordance with ASTM D3212.
          3. Gaskets shall meet the requirements of ASTM F477.
          4. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris.
          5. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
       6. Fittings
          1. Pipe fittings shall be standardized for the type of pipe and joint specified.
          2. In general, all fittings shall be constructed of the same pipe material and material class as the sewer pipe.
          3. Fittings shall meet the requirements of ASTM F 2306, AASHTO M252, or AASHTO M294.

NTS: HDPE perforated pipe dual-walled (ASTM F2648) is available from 2 to 60 inch diameters. For stormwater use it is recommended to use only 6” to 36” diameter. HDPE perforated dual-walled pipe is also available under ASTM F2306 but it does not allow recycled material or diameters smaller than 12”.

Edit “3” below based on project specific requirements.

* + 1. DUAL-WALLED HDPE PERFORATED PIPE
       1. Manufacturers: Equipment from the following manufacturers will be accepted.
          1. ADS-N12 Perforated.
          2. Or approved equal.
       2. Pipe shall be flexible, perforated dual wall HDPE piping with smooth interior walls and a corrugated exterior, unless otherwise noted on the plans.
       3. Perforations shall be cleanly cut, placed in the valley of the corrugation rib, and uniformly spaced along the length of the circumference of the pipe. Pipe connected by bell and spigot joints shall not be perforated in the area of the bells and spigots. Dimensions of the perforations and the minimum perforation inlet area are as follows:

|  |  |  |
| --- | --- | --- |
| Pipe Inside Diameter (in) | Type of Perforation | |
| Circular | |
| Maximum Diameter (in) | Minimum Inlet Area (in2/ft) |
| 12”-18” | 0.375 | 1.5 |
| 21”-36” | 0.375 | 2.0 |

Note: Table per ASTM F2306.

* + - 1. Pipe Material:
         1. 12- through 36-inch shall meet ASTM F2306 or AASHTO M294 Type S.

NTS: Edit Section “5” below to suit the project. Coordinate with Specification 31 05 19 Geosynthetics for Earthwork.

* + - 1. Perforated pipe shall be wrapped in a filter sock, meeting the requirements of ASTM D6707. Pipe trench may be lined with a non-woven geotextile fabric in lieu of the pipe being wrapped in a filter sock. Refer to Section 31 05 19 Geosynthetics for Earthwork for non-woven geosynthetics requirements.
      2. Pipe joints shall not be perforated in the bells and spigots.
      3. Joints
         1. Pipe shall be joined using a bell and spigot joint meeting AASHTO M252 and AASHTO M294.
         2. Joint shall be a soil-tight.
         3. Gaskets shall meet the requirements of ASTM F477.
         4. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris.
         5. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.
      4. Fittings
         1. Pipe fittings shall be standardized for the type of pipe and joint specified.
         2. In general, all fittings shall be constructed of the same pipe material and material class as the sewer pipe.
         3. Fittings shall meet the requirements of ASTM F2306, AASHTO M252, or AASHTO M294.
  1. MARKING FOR IDENTIFICATION
     1. Pipe Markings:

NTS: Delete Paragraph “a” if there is no laying schedule on the project.

* + - 1. Factory-mark each length of pipe and each fitting with designation conforming to those on approved laying schedules.
      2. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.
  1. SOURCE QUALITY CONTROL
     1. Shop Tests:
        1. Pipe manufacturer shall maintain continuous quality control program.
        2. Where applicable and when requested by Engineer, submit results of source quality control tests specified in reference standards.
     2. Pipe may be rejected for failure to conform to these Specifications or following:
        1. Fractures or cracks passing through pipe wall, except single crack not exceeding 2 inches in length at either end of pipe which could be cut off and discarded. Pipes within one shipment shall be rejected if defects exist in more than five percent of shipment or delivery.
        2. Cracks sufficient to impair strength, durability or serviceability of pipe.
        3. Defects indicating improper proportioning, mixing, and molding.
        4. Damaged ends, where such damage prevents making satisfactory joint.
        5. Gouges or scrapes exceeding ten percent of the specified wall thickness.
     3. Acceptance of fittings, stubs or other specifically fabricated pipe sections shall be based on visual inspection at Site and documentation of conformance to these Specifications.

1. EXECUTION
   1. INSPECTION
      1. Inspect pipe materials for defects in material and workmanship. Verify compatibility of pipe and fittings.
   2. INSTALLATION
      1. Buried Piping Installation
         1. Refer to piping installation Section 33 41 00 Storm Utility Piping Installation.
      2. Bedding and Backfill
         1. Refer to Section 31 00 05 Trenching and Earthwork.

NTS: Specifier to consider known construction sequencing and procedures when determining pipe design. Heavy construction loading should be avoided for installed pipes with shallow cover.

* + 1. Contractor shall be responsible for verification of pipe loading during construction. Pipe design is based on final installation depth and required cover.
  1. FIELD QUALITY CONTROL
     1. Complete pipe-testing requirements in accordance with Section 33 41 00 Storm Utility Piping Installation.

+ + END OF SECTION + +